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Fig. 12. *Arctia nais*, male ; pupa on ice, July 10 to August 10 ; imago, Aug. 27
Fig. 13. " " " " " " 8 to " 14 ; " " 25
Fig. 14. " " female ; " " " 7 to " 14 ; " " 24
Fig. 15. " " " " " " 8 to " 14 ; " " 25
Fig. 16. " " " " " " 7 to " 14 ; " " 24
Fig. 17. " " " " " " 7 to " 24 ; " " 31

Fig. 18. " " female ; pupa exposed to + 35–+ 42°C., from July 21-26 ; imago, July 30. Melanotic form.

Fig. 19. *Arctia nais*, male ; pupa exposed to 35–+ 42° C., July 23–July 26 ; imago, August 1.

Fig. 20. *Arctia nais*, male ; pupa exposed to 35– + 42° C., July 20–July 25 ; imago, July 29.

Fig. 21. *Arctia nais*, male ; pupa exposed to 35– + 42° C., July 20–July 25 ; imago, July 29.

Fig. 22. *Arctia nais*, male ; pupa exposed to 35– + 42° C., July 20–July 25 ; imago, July 30.

Fig. 23, *Arctia nais*, male ; pupa exposed to 35– + 42° C., July 20–July 25 ; imago, July 29.

Fig. 24. *Arctia nais*, male ; pupa exposed to 35– + 42° C., July 20–July 25 ; imago, July 31.

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LIFE-HISTORY OF AËDES SMITHII *COQ.*

By John B. Smith, Sc.D.

As Dr. Harrison G. Dyar has described and figured the larva of this species in the last number of this Journal (Vol. IX, p. 178), I will not again rehearse the characters given by him.

My first acquaintance with the insect began in late November, 1900, when Mr. J. Turner Brakeley called my attention to the fact that, in the pitcher plants in the swamps surrounding his cranberry bogs at Lahaway, there were what he thought mosquito larvæ. The matter did not interest me very strongly at the time. I verified the fact that they were mosquito larvæ and, because that species was common about there, I assumed that it was *pungens*. Dr. Howard's pamphlet on mosquitoes had been not long since published, and the larvæ in the leaves of the plant fitted to his pictures and description sufficiently well. As *Culex pungens* breeds everywhere, it did not strike me as especially odd that the larva should be in the leaf pitchers, and I assumed that they were, probably, present in the bog holes and ditches as well.

In reply to the question, what will become of these larvæ, I informed Mr. Brakeley that *Culex pungens* hibernated as an adult ; that the larvæ are dependent upon atmospheric air and that these specimens would undoubtedly die when the winter fairly set in. Mr. Brakeley looked unconvinced; but said nothing at the time.

January 22, 1901, after a spell of bitter cold weather Mr. Brakeley sent me a jar of living larvæ and a statement of how they had been found frozen solid in the leaves of the pitcher plants. The account of my experiments with these larvæ and the record of the early breedings is given in Entomological News, Vol. XII, p. 153, for 1901. It is also printed on pp. 83–90 of Dr. Howard's Mosquito book.

This carries the life-history to the point when, under laboratory conditions, I secured a few adults which I mistook for undersized, immature *Culex pungens*. Later, Mr. C. W. Johnson determined a specimen as *Aëdes fuscus* and under that name the species is several times referred to in the minutes of the meetings of the Feldmann Social, published in the Entomological News.

As the season progressed, Mr. Brakeley kept sending in larvæ and these matured in such numbers that I was able to supply material in sufficient quantity to enable Mr. Coquillett to determine that instead of *Aëdes fuscus* we had a new species to deal with: one which will have to descend to posterity as a member of the Smith family unless perchance it proves to have been previously described.

Mr. Brakeley kept a duplicate series of specimens under observation at Lahaway and his first pupa, from larvæ thawed out of ice February 17th, was obtained April 16th and became adult on the 26th. This gives a period of 58 days in active larval life at an ordinary indoor temperature, or 68 days if the pupal period is counted. Other pupæ and adults developed and the pupal period ranged between 10 and 12 days.

A small lot of specimens gathered April 7th, began pupating May 1st and these had an average pupal period of eight days.

Altogether Mr. Brakeley sent me, prior to May 1st some 15 to 20 lots of larvæ, numbering many hundreds of specimens. All these were kept in the original pitcher leaf water and this never became foul. It required the contents of from 40 to 75 pitchers to make a full pint of liquid and the larvæ numbered from 2 to 20 or more in each leaf. Culture after culture was closed out during the summer; but though the conditions for all the larvæ in a single jar were absolutely the same, the rate of development varied in each individual. One quart jar, containing nearly 200 larvæ received in early March, developed adults throughout the summer and this was not closed out until September 13, 1901, six months after its receipt, when there were yet a few larvæ, two or three pupæ and one or two adults! These larvæ had been surely hatched in November, 1900, and had remained in that condition for certainly ten months, including the entire summer.

May 31, June 1 and 2, were spent at Lahaway with Mr. Brakeley, and during those days the swamps for some distance around were visited and dozens of pitcher plants closely examined.

In the areas flooded during the winter by cranberry bog operations, no larvæ were found; but as soon as the flood line was passed, larvæ were taken; generally half a dozen or more to a leaf. But none occurred except in the leaves. This point was tested very thoroughly throughout the season and it is absolutely certain that this little species does not occur anywhere outside of the receptacles formed by *Sarracenia*, except by accident. In the colder, shaded parts of the swamp, where springs occurred, larvæ only were found. In the warmer areas pupæ were common and, in some places, where the water and moss surrounding the plant were actually tepid, the insects had already emerged and nothing but empty pupa shells could be found. It seems to be entirely a matter of temperature and, in some of the coldest places, no transformations would be likely to occur much before late June. It is certain that most hibernating larvæ live from early November to late May or early June, a period of fully six months. No adult *Aëdes* could be found and certainly none made any attempt to bite. Nor could egg masses or young larvæ be discovered at this time. New leaves were developing on the pitcher plant groups; but few had the lobes opened and fewer yet contained any water. Such of these as were examined contained no insect life and only here and there one had trapped insects; none had begun to digest or assimilate the animal food.

An open swamp at the head of a cranberry bog had most of the leaves with pupal shells only; but though there must have been hundreds of adult *Aëdes* about, not one could be found flying, nor could we stir them up. In a deep, cold, huckleberry swamp, only larvæ were found. It was fair to conclude from the three days' tramp that no summer brood of larvæ had yet begun, and it seemed strongly indicated that *Aëdes* would not bite, even if given the opportunity. In confirmation it may be said that late in the summer Mr. Brakeley saw *Aëdes* flying, and though there must have been thousands round about, none made any effort to disturb him.

Unfortunately Mr. Brakeley could not be at Lahaway during the summer ; but arrangements were made to ship into New Brunswick at ten-day intervals the contests of from three to six pitchers, that I might be kept posted as to developments. The intense heat of midsummer and a fire which destroyed barn and horses interfered with the regularity of the sendings.

July 3d, the leaves contained half and full grown larvæ ; but neither pupæ nor very small larvæ. July 13th, old and new leaves contained very small larvæ—evidently of recent date, while the old leaves had also full grown larvæ and pupæ. There was, therefore, a new series of larvæ and probably the first summer brood. July 23d, the older leaves had very few larvæ ; but almost as many very small as large ones. The new leaves had all stages, from very small larvæ to pupæ. The indications were, therefore, that the first summer brood was coming to maturity, developing in from 15 to 20 days, while there are yet adult individuals from the winter larva that are ovipositing. From the small number of young larvæ in individual leaves, the indications were that eggs were laid either singly or in small groups.

The next sending did not come until August 21st, and then there was everything from the most minute larva to pupæ just ready to transform. So small were some of the larvæ that I hunted for eggs or egg-shells ; but failed to recognize any. It is probable that the youngest larvæ represent a third brood ; but breeding is practically continuous : all stages being found at any time after the middle of July.

September 1st, the same conditions existed and there was a large number of larvæ so small that it seemed as if at least egg-shells must yet remain ; but none were found. Fortunately Mr. Brakeley returned to Lahaway early in this month and on the 13th—lucky day—he found the eggs floating on the surface of the water in the pitcher plants.

September 14th I had an opportunity to spend a couple of hours in a swamp in the pines near Hanover Station, Burlington County, and found the pitcher plants there full of the *Aëdes* in all stages from babes to pupæ. Collected the entire contents of a number of the pitchers in alcohol, and found afterward that eggs were present in some numbers. But meanwhile Mr. Brakeley had positively identified the eggs and had even bred from them a lot of larvæ, making the relation absolutely certain. He collected from time to time until October 20th, and found anywhere from 5 or 6 to 30 or more eggs in a single leaf. Oviposition was continuous; but on only two occasions were adults seen apparently engaged in the process. It may be that the egg-laying is done mostly at night.

After the eggs had once been identified there was no difficulty in finding them ; but it was noted that in the older leaves where larvæ were now most abundant, eggs were not so plentiful as they should be to account for the large winter supply. So attention was directed to the younger leaves even where there was as yet no water in them. Here, it was discovered, was the favorite place for ovipositing, with this species. Eggs were laid in leaves as yet perfectly dry ; at the bottom and at the sides ; singly or in little groups ; whether by one or more than one female was not ascertained. Of the old leaves many become imperfect in late fall and any puncture or decay allowing the water to escape, would of course mean the death of the larvæ. So the new leaves are selected and in them many more eggs were found than in the others. In one case Mr. Brakeley counted up to 75, then lumped the remainder and called it 100. It is scarcely probable that any one female of this species is capable of producing 100 eggs of the comparatively large size of those in question ; so two at least and possibly more females may oviposit in a suitable leaf.

Observations were continued until frost, which came unusually early in 1901. Up to November eggs were found and, early in that month, a few pupæ. So breeding is continued just as long as there is a chance to keep it up.

The eggs are chestnut brown in color, somewhat chunky, bean-shaped, the ends somewhat pointed, the inner margin nearly straight. There is no evident sculpture ; yet when first mounted and examined under the microscope, there seems to be a somewhat irregular tessellated reticulation that disappears later, when the shell becomes more transparent.

In the previously published notes it was brought out that this larva does not need to come to the surface for air as much as recorded for *Culex*. Dr. Howard informs me that a lot of larvæ that I sent him lived for nearly two weeks under a film of oil which covered the surface of their breeding jar.

One of my students demonstrated in the laboratory a very complete tracheal system in the anal processes of the larva ; so we have really a gill structure, by means of which the insect gets its supply of oxygen directly from the water.

Briefly stated, the life history is as follows: The insect winters in the larval stage, freezing and thawing as often as need be during that season. It pupates late in May and becomes adult a week or ten days later. Eggs are laid in the leaves singly or in small groups; fastened to the sides or floating on the surface. The summer broods mature in about a month, and there are probably three if not four series; but the broods overlap so much that the breeding is practically continuous. Late in the season the adults select the new leaves for oviposition even if they are yet dry.

There is little difference in appearance between the sexes and the antennæ of the male are hardly plumose.

In New Jersey the larvæ breed in the leaves of *Sarracenia purpurea* only; but not everywhere, for Mr. E. L. Dickerson, who examined a large number of plants for me in Morris County, says positively that there are no mosquito larvæ in any of them. Whether exceptionally or normally, the water in the plants examined by him was foul, and in such a mixture this larva does not live. On the other hand, Mr. D. W. Coquillett tells me that he has the species from Florida, where it breeds in the leaves of an orchidaceous plant growing on trees.

This is the Jersey mosquito for which I claim that it does not bite!

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NOTES ON THE LIFE-HISTORY AND HABITS OF ONCIDERES TEXANA.

By GLENN W. HERRICK.

While inspecting nurseries in Biloxi and Ocean Springs, Mississippi, the writer noted that the branches of many pecan trees in the nursery rows were cleanly severed as though by some insect, probably a beetle. On further investigation a puncture in the bark just beneath every bud on the severed portion was evident. In the majority of these punctures was found a minute egg, from which the larvæ and pupæ of *Oncideres texana* Horn, have been reared and observed for nearly two years.

Mr. James Brodie of Biloxi, has aided me greatly in observing the habits of the adults and in sending me material. I shall frequently quote Mr. Brodie's own words.